Comparative assessment of biofilm sampling methods on stainless steel surfaces in a CDC biofilm reactor

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The presence of biofilms on stainless steel surfaces in the dairy industry greatly limits the efficiency of the cleaning procedures. The matrix of extracellular polymeric substances produced by the embedded bacteria is largely responsible for this irreversible binding. Therefore, to detach the biofilm in its entirety from the surface for microbiological identification and physico-chemical characterization is limited with the classical methods commonly used for surface sampling such as swabbing. The objective of this study is to optimize an extraction technique of biofilm formed using a dynamic CDC bioreactor system by a strain of Pseudomonas fluorescens isolated from the dairy industry during a biofilm issue. Three methods: swabbing, scraping and sonic brushing were tested in order to determine which one of these techniques allows a better recovery of the biofilm. They were also compared to sonication which is the standard method established by ASTM International. The results demonstrated that the total viable counts obtained by scraping (8.65 ± 0.07 CFU/cm²) were not significantly different from those achieved by sonication (8.74 ± 0.06 CFU/cm²) in contrast to the other two approaches, while scanning electron microscopy showed an effective removal of biofilms from surfaces by sonic brushing. In conclusion, other combinations including brushing, sonication and/or scraping must be investigated for representative sampling of biofilm on the surfaces of dairy plants.